

Micromegas detectors - Operating instructions

1. General

There are 12 Micromegas detectors assembled in 3 stations (MM01 to MM03) of 4 planes each (V, U, X, Y from upstream to downstream). All detectors are identical. The active area is $40 \times 40 \text{ cm}^2$, and the gas volume 6 liters per detector. Detectors are assembled in doublets back to back with one gas line per doublet.

The gas mixture is $\text{Ne} + 10\% \text{C}_2\text{H}_6$ with voltages 380 / 840 V on the mesh / drift electrodes when running with a hadron beam. The gas mixture is $\text{Ne} + 10\% \text{C}_2\text{H}_6 + 10\% \text{CF}_4$ with voltages 400 / 870 V on the mesh / drift electrodes when running with a muon beam. The gas flow (about 1 liter per doublet) and gas mixture is set via the touch screen of the PLC3 located in the COMPASS gas area (password required to change percentages: 6535).

The High Voltages are set using the Saclay Slow Control software (Saclay barrack, on top of the Gas Area).

Phones : -Saclay 'on call' : 16 0731
 -A.Magnon : 16 3943

2. Start-up of MMs operational gas flow

- a. Make sure that all gas pipes are connected. (This should be the default situation during both beam time and winter shutdown).
- b. Purge detectors with Argon (2days).
- c. Perform leak test for all 3 detectors, using Argon gas only. The leak test has to be made at least once per year, before the run.
- d. Open the MM/DC ethane valve in flammable gas arrival rack. (Check whether the DCs detectors are also ready – they share the same valve!)
- e. Set the ethane fraction to 10 % in PLC3 (See PLC3 instructions on next page).
- f. Set the CF_4 fraction to 10% for muon beam, 0% for hadron beam
- g. Changing 4 times a doublet volume (2 detectors connected in series) takes 2 day.

Note : High Voltage must be turned ON only after the gas mixture is close to nominal.

3. Purging flammable gas and shut-down of MMs

- a. Set High Voltage OFF (Slow Control commands are in the Saclay barrack or in the COMPASS control room).
- b. Set the ethane fraction to 0% in PLC3. (See PLC3 instructions on next page).
- c. Set the CF_4 fraction to 0% in PLC3. (See PLC3 instructions on next page).
- d. Close the MM/DC ethane valve in flammable gas arrival rack (if DCs detectors have also been prepared for this operation).

- e. Purge completely all MM doublets with Neon or Argon. Changing 4 times a doublet volume (2 detectors connected in series) takes 2 days.

4. Operation

- a. MMs gas flows and mixtures are controlled by PLC3 and by the flow-meters in the MM/DC gas rack.
- b. MMs High Voltage and threshold settings are controlled by the COMPASS slow control. For Slow Control commands go in the Saclay barrack.
- c. Check the 6 MM bubblers twice per shift. Normal bubbling is in the range: 0.3-0.6 Hz.

5. PLC3 operation

- a. On the touch screen: select MM
- b. Push the MENU button
- c. Push the R4 box in order to enter the password.
- d. Type the password: 6535 and then push ENTER.
- e. Push the ESC button
- f. Select the R1 button (Ethane proportion). This proportion is either 0 (no flammable gas) or 10 (during data taking).
- g. Change the CF4 proportion (if needed).